

AMENDMENTS TO THE CLAIMS

1. (currently amended) A compact, hydrogen generator comprising:
a shell having an inlet port, an outlet port and a conduit between the inlet port and the outlet port having a diameter;

a reformer in the conduit adapted to convert for converting a fuel and either steam or steam and oxygen into a reformat containing comprising hydrogen and carbon oxides;

a downstream shift reactor in the conduit downstream of the reformer spaced by a distance less than about three times the diameter having at least one catalyst stage adapted to convert for converting carbon monoxide in the reformat with water to carbon dioxide and hydrogen;

,said shift reactor having at least one catalyst stage; a conduit from the reformer and encompassing the shift reactor for passing the reformat from the reformer through the shift reactor; and

a heat exchanger/distributor within in the conduit for adapted to cool [ing] and inject steam into the reformat ,said heat exchanger/distributor comprising:

(a) an indirect heat exchanger comprising a coiled tube in the conduit adapted to receive [d] liquid water, and having sufficient surface area to vaporize the received liquid water to steam, and adapted to cool the reformat in the conduit,

(b) at least one a separator in fluid communication with the indirect heat exchanger comprising a riser in the conduit attached to the coiled tube adapted to receive steam from the coiled tube indirect heat exchanger and to remove substantially all liquid water therefrom, and

(c) at least one a steam distributor attached to the riser having an opening in fluid communication with the separator riser adapted to pass the steam into the reformat conduit.

2. (currently amended) The hydrogen generator of claim 1 ~~in which the generator further comprises an~~ further comprising a second ~~indirect heat exchanger/distributor in the conduit substantially identical in construction to the heat exchanger/distributor.~~
for heat exchange with reformat in the conduit.

3. (currently amended) The hydrogen generator of claim 2 ~~in which~~ wherein the ~~second indirect~~ heat exchanger /distributor is positioned upstream of the first heat exchanger/distributor.

4. (currently amended) The hydrogen generator of claim 1 ~~in which~~ wherein the heat exchanger/distributor comprises a plurality of steam distributors on the riser in fluid communication with the riser.
~~at least one separator is a riser.~~

5. (currently amended) The hydrogen generator of claim 1 ~~in which~~ wherein the heat exchanger/distributor comprises ~~at least 4~~ a plurality of steam distributors comprising arms attached to the riser.

6. (currently amended) The hydrogen generator of claim 1 ~~in which~~ wherein the heat exchanger/distributor is located between the reformer and the ~~water-gas~~ shift reactor.

7. (currently amended) The hydrogen generator of claim 1 ~~in which~~ wherein the ~~water-gas~~ shift reactor comprises at least two catalyst stages and the heat exchanger/distributor is located between the two catalyst stages

Claims 8-20 (canceled)

21. (new) The hydrogen generator of claim 1 wherein the coiled tube has a surface area sufficient to vaporize essentially all of the liquid water in the coiled tube to steam.

22. (new) The hydrogen generator of claim 1 further comprising an indirect heat exchanger surrounding the conduit, and a second heat exchanger/distributor between the reformer and the shifter reactor.

23. (new) A hydrogen generator comprising:
a shell having an inlet port adapted to receive a fuel, an outlet port and a conduit between the inlet port and the outlet port;
a reformer in the conduit adapted to convert the fuel into a reformat comprising hydrogen and carbon oxides;
an indirect heat exchanger surrounding the conduit adapted to cool the reformat;
a first indirect heat exchanger/distributor in the conduit adapted to cool and inject steam into the reformat;
a shift reactor in the conduit downstream of the reformer having a first catalyst stage and a second catalyst stage adapted to convert carbon monoxide in the reformat to carbon dioxide and hydrogen; and
a second heat exchanger/distributor in the conduit between the first catalyst stage and the second catalyst stage adapted to cool and inject steam into the reformat;
each heat exchanger/distributor comprising a coiled tube in the conduit adapted to receive liquid water and to vaporize essentially all of the liquid water to steam, a separator in fluid communication with the coiled tube configured to separate any remaining water, and a distributor having an opening in fluid communication with the riser configured to pass steam into the conduit.

24. (new) The hydrogen generator of claim 23 wherein the shell has a diameter and the shift reactor is spaced from the reformer by within about three diameters.

25. (new) The hydrogen generator of claim 23 wherein the separator comprises a riser and the distributor comprises a plurality of arms attached to the riser.